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IS 11071-3 (1984): Inset type aerodrome lighting fittings,  
Part 3: Approach lighting fittings [ETD 24: Illumination  
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# *Indian Standard*

## SPECIFICATION FOR INSET TYPE AERODROME LIGHTING FITTINGS

### PART 3 APPROACH LIGHTING FITTINGS

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INDIAN STANDARDS INSTITUTION  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

*Indian Standard*

SPECIFICATION FOR  
INSET TYPE AERODROME LIGHTING FITTINGS

**PART 3 APPROACH LIGHTING FITTINGS**

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*Indian Standard*  
SPECIFICATION FOR  
INSET TYPE AERODROME LIGHTING FITTINGS  
**PART 3 APPROACH LIGHTING FITTINGS**

**0. FOREWORD**

**0.1** This Indian Standard ( Part 3 ) was adopted by the Indian Standards Institution on 5 October 1984, after the draft finalized by Illuminating Engineering and Luminaires Sectional Committee had been approved by the Electrotechnical Division Council.

**0.2** This standard is intended to deal with the specific requirements of inset approach lighting fittings. The standard has been developed with a view to ensure good design, high quality workmanship and test procedures so that the fittings provide reliable service in actual field application under low visibility conditions.

**0.3** This standard is one among the series being developed for inset type of lighting installations to be provided at airports in this country. This series consists of the following parts:

- Part 1 General requirements and tests
- Part 2 Runway centre line lighting fittings
- Part 3 Approach lighting fittings
- Part 4 Touch down zone lighting fittings

**0.4** This standard shall be read in conjunction with Part 1 of this standard. This standard ( Part 3 ), in making reference to Part 1 of this standard, specify the extent to which Part 1 is applicable and also includes additional requirements as necessary for approach lighting fittings.

**0.5** In the preparation of this standard assistance has been taken from the following:

International standards and recommended practices — Aerodromes Annex 14 ( 1976 ). Ed 7. International Civil Aviation Organization.

Aerodrome design manual; Part 4 Visual aids. Ed 1. 1976. International Civil Aviation Organization.

Advisory circular No. 150/5345-46 ( 1975 ) Specification for semiflush airport lights, issued by Department of Transportation Federal Aviation Administration, U.S.A.

**0.6** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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## **1. SCOPE**

**1.1** This standard ( Part 3 ) specifies the photometric performance and the essential mechanical and electrical requirements ( excluding lamps ) of inset type approach lighting fittings to be installed in runway pavements.

## **2. TERMINOLOGY**

**2.1** For the purpose of this standard definitions given in Part 1 of this standard shall apply.

## **3. CONDITIONS OF USE**

**3.1** The provisions of 3 of Part 1 of this standard shall apply.

## **4. GENERAL CONSTRUCTION**

**4.1** The provisions of 4 of Part 1 of this standard shall apply.

**4.2** The inset approach lighting fittings ( approach centre line lights, approach side row lights and threshold lights ) shall be of uni-directional type and shall emit a light beam in the direction of approach. The assembled lighting fitting shall not project above the surrounding pavements by more than 26.00 mm.

## **5. OPERATING TEMPERATURE**

**5.1** The provisions of 5 of Part 1 of this standard shall apply.

## **6. OPTICAL COMPONENTS**

**6.1** The provisions of 6 of Part 1 of this standard shall apply.

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\*Rules for rounding off numerical values (*revised*).

## 7. ALIGNMENT DEVICE

7.1 The provisions of 7 of Part 1 of this standard shall apply.

## 8. WATER TIGHTNESS OF THE UNIT

8.1 The provisions of 8 of Part 1 of this standard shall apply.

## 9. ELECTRIC COMPONENTS

9.1 The provisions of 9 of Part 1 of this standard shall apply.

## 10. MARKING

10.1 The provisions of 10 of Part 1 of this standard shall apply.

## 11. TESTS

### 11.1 Classification of Tests

11.1.1 *Type Tests* — The following shall constitute the type tests:

- a) Visual examination (*see 11.2*),
- b) Photometric test (*see 11.3*),
- c) Insulation resistance test (*see 11.4*),
- d) Vibration test (*see 11.5*),
- e) Cycling and temperature shock test (*see 11.6*),
- f) Low temperature test (*see 11.7*),
- g) Accelerated life test (*see 11.8*),
- h) Static load test (*see 11.9*),
- j) Leakage test (*see 11.10*),
- k) Impact test (*see 11.11*),
- m) Horizontal static load test (*see 11.12*),
- n) Hydraulic impact test (*see 11.13*),
- p) Protective plating test (*see 11.14*),
- q) Lamp by-pass test (*see 11.15*),
- r) Surface temperature test (*see 11.16*),
- s) Humidity test (*see 11.17*),
- t) Salt spray test (*see 11.18*),
- u) Rain test (*see 11.19*), and
- v) Dust test (*see 11.20*).

**11.1.2 Acceptance Test** — The following shall constitute the acceptance tests:

- a) Visual examination ( see 11.2 ),
- b) Photometric test ( see 11.3 ),
- c) Insulation resistance test ( see 11.4 ),
- d) Vibration test ( see 11.5 ),
- e) Cycling and thermal shock test ( see 11.6 ),
- f) Static load test ( see 11.9 ),
- g) Leakage test ( see 11.10 ),
- h) Impact test ( see 11.11 ), and
- j) Horizontal static load test ( see 11.13 ).

**11.1.3 Routine Test** — The following shall constitute the routine tests:

- a) Visual examination ( see 11.2 ),
- b) Photometric test ( see 11.3 ),
- c) Insulation resistance test ( see 11.4 ), and
- d) Leakage test ( see 11.10 ).

**11.2 Visual Examination** — The provisions of 11.2 of Part 1 of this standard shall apply.

### **11.3 Photometric Tests**

**11.3.1** The provisions of 11.3 of Part 1 of this standard shall apply.

**11.3.2** Vertical and horizontal intensities shall be determined at one degree interval and are indicated in Appendix A, for approach centre line and cross bar lights, side row lights and three hold lights.

**11.3.3** For the purpose of routine test the photometric test shall be made and intensity measurements shall be made:

- a) at horizontal angles of plus and minus 5 degrees from centre line axis in a plane with an elevation angles of  $6^\circ$ , and
- b) at  $12^\circ$  vertical and  $0^\circ$  horizontal. The values obtained shall correspond to those given in Appendix A.

**11.4 Insulation Resistance Test** — The provisions of 11.4 of Part 1 of this standard shall apply.

**11.5 Vibration Test** — The provisions of 11.5 of Part 1 of this standard shall apply.

**11.6 Cycling and Thermal Shock Test** — The provisions of 11.6 of Part 1 of this standard shall apply.

**11.7 Low Temperature Test** — The provisions of 11.7 of Part 1 of this standard shall apply.

**11.8 Accelerated Life Test** — The provisions of 11.8 of Part 1 of this standard shall apply.

**11.9 Static Load Test** — The provisions of 11.9 of Part 1 of this standard shall apply.

**11.10 Leakage Test** — The provisions of 11.10 of Part 1 of this standard shall apply.

**11.11 Impact Test** — The provisions of 11.11 of Part 1 of this standard shall apply.

**11.12 Horizontal Static Load Test** — The provisions of 11.12 of Part 1 of this standard shall apply.

**11.13 Hydraulic Impact Test** — The provisions of 11.13 of Part 1 of this standard shall apply.

**11.14 Protective Plating Test** — The provisions of 11.14 of Part 1 of this standard shall apply.

**11.15 Lamp By-pass Test** — The provisions of 11.15 of Part 1 of this standard shall apply.

**11.16 Surface Temperature Test** — The provisions of 11.16 of Part 1 of this standard shall apply.

**11.17 Humidity Test** — The provisions of 11.17 of Part 1 of this standard shall apply.

**11.18 Salt Spray Test** — The provisions of 11.18 of Part 1 of this standard shall apply.

**11.19 Rain Test** — The provisions of 11.19 of Part 1 of this standard shall apply.

**11.20 Dust Test** — The provisions of 11.20 of Part 1 of this standard shall apply.

# APPENDIX A

( Clauses 11.3.2 and 11.3.3 )

## PHOTOMETRIC REQUIREMENTS OF APPROACH CENTRE LINE AND CROSSBARS, APPROACH SIDE ROW AND THRESHOLD LIGHTING FITTINGS

LIGHT	COLOUR	MINIMUM BEAM COVERAGE								MINIMUM AVERAGE INTENSITY IN SPECIFIED COLOURS $\text{cd} \times 10^3$ ( see Note 3 )	LIMITS OF AVERAGE INTENSITY ( see Note 4 )		ANGULAR SETTINGS ( see Note 5 )	
		Main Beam ( see Note 1 )		( see Note 2 )				Ratio			Elevation	Toe-in		
		H	V	10%		5%		H	V	( degrees )	( degrees )			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)			
Approach centre line and crossbars ( see Fig. 1 )	White	20	11	28	13	30	17	20	1·5-2, Max	8·5·5 ( see Note 6 )	0·2 ( see Note 6 )			
Approach side row ( see Fig. 2 )	Red	14	10	23	12	33	16	5	0·5-1	6·5-5·5 ( see Note 6 )	2			
Threshold ( see Fig. 3 )	Green	11	9	15	12	18	17	10	1·0-1·5	5·5	3·5			

NOTE 1 — Throughout this region the intensity of a new unused light at maximum current/voltage should be not less than half the average intensity and should not exceed the average intensity by more than 50 percent.

NOTE 2 — At 10 percent and 5 percent of average intensity.

NOTE 3 — Within beam coverages specified in col 3 and 4.

NOTE 4 — The average intensity over the angles specified in col 3 and 4 of a typical new light as compared to the average intensity of runway edge light.

NOTE 5 — Settings are based upon beam coverages given in col 3 and 4. If lights have greater beam coverages, settings should be adjusted appropriately. The normal beam axis is located midway between the 50 percent intensity points of the horizontal and vertical intensity curves. When two figures are indicated for angular settings the higher value refers to lights farther from the threshold.

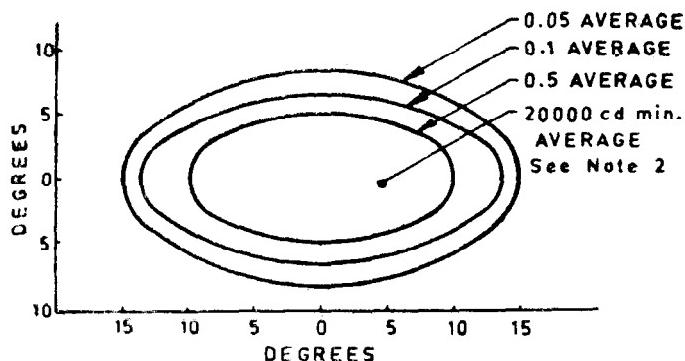
**NOTE 6**—Details of setting angles for col 11 and 12 are as follows:

**Col 11, approach centre line and crossbars**

Threshold to 315 m	= 5·5°
316 m to 475 m	= 6°
476 m to 640 m	= 7°
641 m and beyond	= 8°
Approach side row	
Threshold to 115 m	= 5·5°
116 m to 215 m	= 6·0°
216 m and beyond	= 6·5°

Col 12, lights in crossbars beyond 22·5 m from the centre line should be toed-in 2 degrees. All other lights should be 0 degree toed-in.

- 6** If fittings with beam coverages greater than those specified are used, elevation and toe-in angles should be adjusted appropriately.



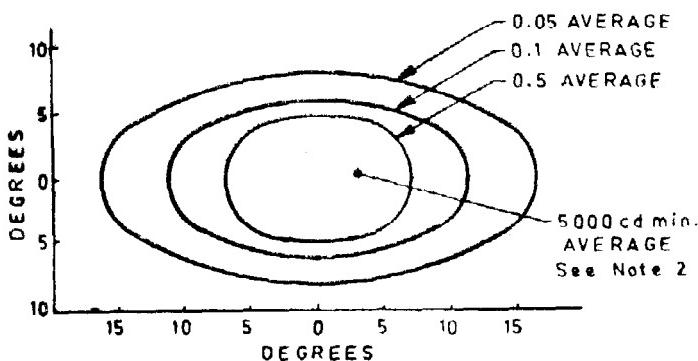
*See Appendix A*

NOTE 1 — Curves calculated on formula  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

a	10	14	15
b	5	6.5	8.5

NOTE 2 — Maximum should not exceed 1.5 times actual average.

FIG. 1 APPROACH LIGHT CENTRE LINE AND CROSSBARS



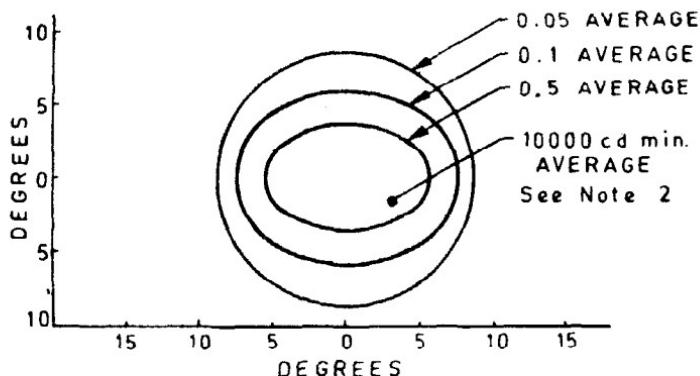
*See Appendix A*

NOTE 1 — Curves calculated on formula  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

a	7.0	11.5	16.5
b	5	6	8

NOTE 2 — Maximum should not exceed 1.5 times actual average.

FIG. 2 APPROACH LIGHT SIDE ROW



See Appendix A

a	5.5	7.5	9
b	5	6	8.5

NOTE 1 — Curves calculated on formula  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

NOTE 2 — Maximum should not exceed 1.5 times actual average.

FIG. 3 THRESHOLD LIGHTS

# INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

## **Base Units**

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

## **Supplementary Units**

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

## **Derived Units**

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s <sup>2</sup>
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m <sup>2</sup>
Frequency	hertz	Hz	1 Hz = 1 c/s (s <sup>-1</sup> )
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress,	pascal	Pa	1 Pa = 1 N/m <sup>2</sup>